Casco Quadrangle, Maine

Surficial geologic mapping by
Carol T. Hildreth

Digital cartography by:
Robert A. Johnston

Robert G. Marvinney
State Geologist

Cartographic design and editing by:
Robert D. Tucker

Funding for the preparation of this map was provided in part by the U. S. Geological Survey STATEMAP Program, Cooperative Agreement No. 99HQAG0119.

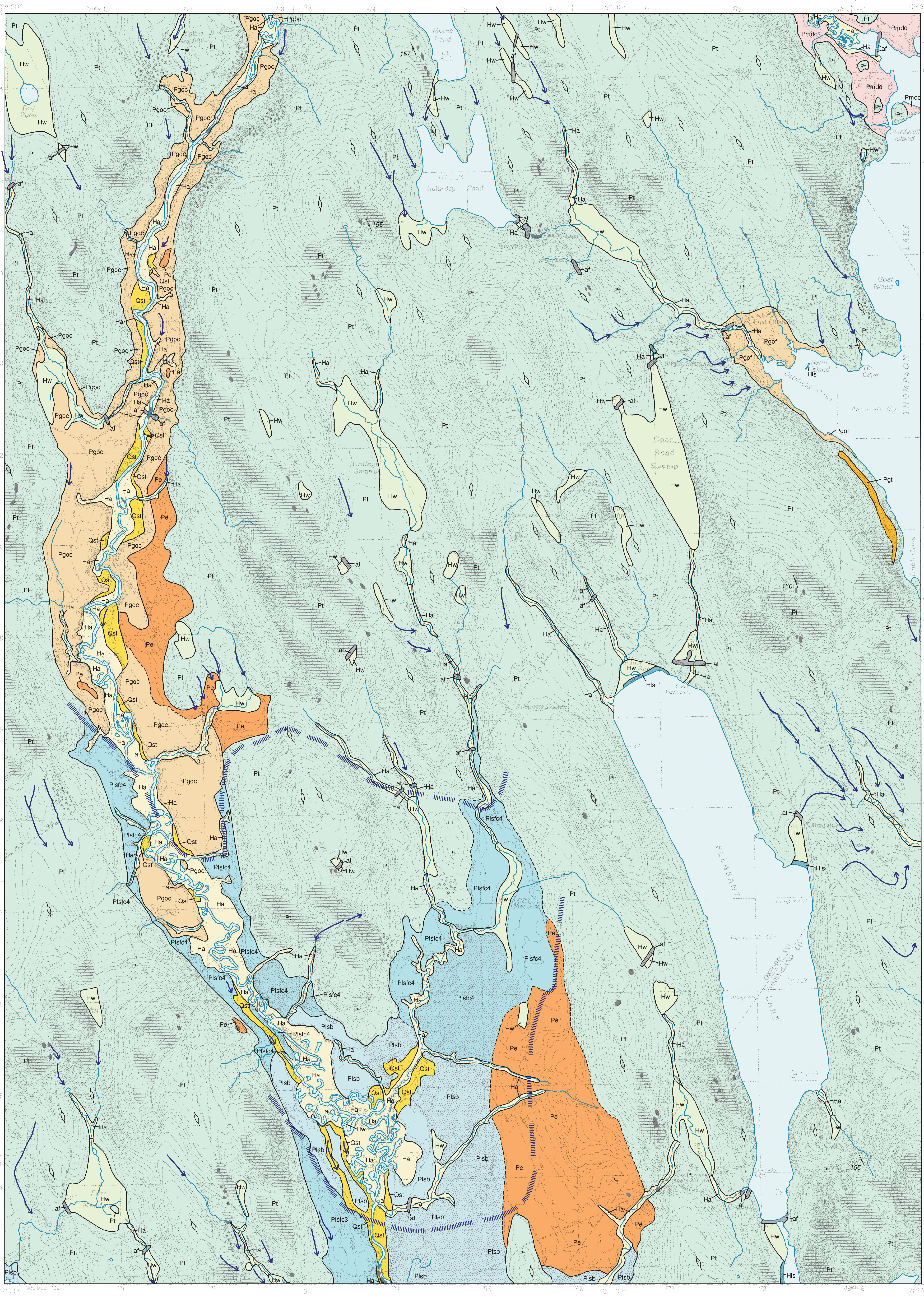
Maine Geological Survey

Address: 22 State House Station, Augusta, Maine 04333
Telephone: 207-287-2801 **E-mail:** mgs@maine.gov
Home page: http://www.maine.gov/doc/nrimc/nrimc.htm

Open-File No. 00-141
2000

For additional information,
see Open-File Report 00-142.

Surficial Geology



SOURCES OF INFORMATION

Surficial geologic mapping of the Casco quadrangle was conducted by Carol T. Hildreth during the 1999 field season. Funding for this work was provided by the U. S. Geological Survey STATEMAP program and the Maine Geological Survey, Department of Conservation.

Quadrangle Location

SCALE 1 : 24,000

1 MILE — 1000 0 1000 2000 3000 4000 5000 6000 7000 FEET — 1 KILOMETER

CONTOUR INTERVAL 10 FEET

TRUE NORTH

Topographic base from U.S. Geological Survey Casco quadrangle, scale 1:24,000 using standard U.S. Geological Survey topographic map symbols.

The use of industry, firm, or local government names on this map is for location purposes only and does not impute responsibility for any present or potential effects on the natural resources.

NOTE: A very thin, discontinuous layer of windblown sand and silt, generally mixed with underlying glacial deposits by frost action and bioturbation, is present near the ground surface over much of the map area but is not shown.

af — **Artificial fill** - Man-made. Material varies from natural sand and gravel to quarry waste to sanitary landfill; includes highway and railroad embankments and dredge spoil areas. This material is mapped only where it can be identified using the topographic contour lines. Minor artificial fill is present in virtually all developed areas of the quadrangle. Thickness of fill varies.

Ha — **Stream alluvium** (Holocene) - Sand, silt, gravel, and muck in flood plains along present rivers and streams. As much as 3 m (10 ft) thick. Extent of alluvium indicates most areas flooded in the past that may be subject to future flooding. In places, this unit is indistinguishable from, grades into, or is interbedded with freshwater wetlands deposits (Hw).

Hw — **Freshwater wetland deposit** (Holocene) - Muck, peat, silt, and sand. Generally 0.5 to 3 m (1 to 10 ft) thick. In places, this unit is indistinguishable from, grades into, or is interbedded with stream alluvium (Ha).

Hls — **Modern beach deposit** - Sand and/or gravel with silt in places. Developed along the present and prehistoric shorelines of lakes and ponds. Most extensive and thickest on larger lakes; 0.5 to 2 m (1 to 6 ft) thick. Includes spit deposits and may include dune deposits.

Qst — **Stream terrace deposit** (Holocene and Late Pleistocene) - Sand, silt, gravel, and occasional muck on terraces cut into glacial deposits in the Crooked River valley. In places, two to four distinct terrace levels exist. They are all lumped into one unit here. These terraces formed in part during late-glacial time during the draining of glacial Lake Sebago. From 0.5 to 5 m (1 to 15 ft) thick.

Pe — **Eolian deposit** (Pleistocene) - Fine- to medium-grained, well-sorted sand. Found as small dunes on a variety of older glacial deposits (shown by dotted pattern in areas where relatively abundant but thin and equal to or less than 1 m (3 ft) thick). Deposited after glacial Lake Sebago regressed from the area and left many fine-grained lake-bottom sediments exposed to wind erosion and transport before vegetation established itself and anchored the deposits. Most are found east of the Crooked River, which indicates they were deposited by prevailing westerly winds.

Plsb — **Glacial Lake Sebago bottom deposit** (Pleistocene) - Massive to stratified and cross-stratified sand (generally fine- to medium-grained) and massive to laminated silt and silty clay. Locally may contain boulders, sand, and gravel. Found as a blanket deposit over bedrock and older glacial sediments. Deposited at bottom of glacial Lake Sebago during glacial and late-glacial time. Deposits of this unit occupy the lowest elevations in the quadrangle. Variable thickness, generally 0.5-21 m (1-70 ft).

Pgoc — **Glaciofluvial and glaciolacustrine deposits of the Crooked River** (Pleistocene) - Sand, gravel, silt, and mud. Consists of undifferentiated outwash and lake deposits graded to glacial Lake Sebago. In places overlain by unmapped thin dune deposits. Variable thickness, generally 0.5-15 meters (1-50 ft).

Plsfc — **Glaciofluvial and glaciolacustrine fan deposits of the Crooked River valley** (Pleistocene) - Sand, silt, and minor gravel, deposited in contact with or beyond the adjacent ice as ice-channel fillings, kame-terrace or kame-delta deposits, and most commonly as lacustrine fan deposits laid down by meltwater that flowed south into glacial Lake Sebago. Differentiated from surrounding similar materials by evidence of ice contact, including faults and/or kettle holes, as well as foreset bedding. Depressions in the surfaces of all these deposits, some of which are kettle holes, are filled with up to 3 m (10 ft) of silt-clay varves. Kettle holes in these deposits above the projected glacial Lake Sebago level are filled with windblown silt and fine sand.

$Plsfc_4$ — Lacustrine fan, kame-terrace, and kame-delta deposits. The eastern head of outwash includes an ice-contact lacustrine fan at an elevation of 110+ m (360+ ft) and contains foreset beds that dip southwest, but no topset beds. Deposits are as much as 15 m (50 ft) thick.

$Plsfc_3$ — Lacustrine fan, kame-terrace, and kame-delta deposits. The western head of outwash of $Plsfc_3$ was built as a kame-terrace delta at an elevation of 116+ m (380 ft) near Tea Swamp. Deposits are as much as 18 m (60 ft) thick.

Pmdo — **Glaciomarine delta** - Sand and gravel outwash delta, deposited in north end of Thompson Lake valley.

Pgof — **Glaciofluvial fan deposits in East Otisfield area** (Pleistocene) - Sand, silt, gravel, and mud. Consists of outwash fan deposits that may have been graded to the contemporary sea level in the Thompson Lake valley. Thickness varies 0.5-7 m (1-20 ft).

Pgt — **Undifferentiated glacial deposits of Thompson Lake area** - Sand, silt, and gravel. Consists of thin deposits on a narrow shelf area on the west shore of the lake. Thickness varies from 0-2 m (0-5 ft).

Pt — **Till** (Pleistocene) - Light- to dark-gray, nonsorted to poorly sorted mixture of clay, silt, sand, pebbles, cobbles, and boulders; a predominantly sandy diamicton containing some gravel. Generally underlies most other deposits. Thickness varies and generally is less than 6 m (20 ft), but may exceed 30 m (100 ft) under drumlins and streamlined hills. Many streamlined hills in this area are bedrock-cored.

Bedrock exposures. Not all individual outcrops are shown on the map. Gray dots indicate individual outcrops; ruled pattern indicates areas of abundant exposures and areas where surficial deposits are generally less than 3 m (10 ft) thick. Mapped in part from aerial photography, soil surveys (Hedstrom, 1974), and previous geologic maps (Thompson, 1977).

Contact - Boundary between map units. Dashed where very approximate.

Direction of glacial meltwater or meteoric water flow over outwash or till deposit.

Glacial striation. Point of observation is at dot. Number indicates azimuth (in degrees) of former ice-flow direction.

Drumlin form or streamlined hill. Symbol is parallel to direction of glacial ice movement.

Area of many large boulders.

Area where older sediments are overlain by thin (typically less than 1 m) deposits of dune sand.

Inferred approximate ice-frontal position at time of deposition of meltwater deposits

REFERENCES

Hedstrom, G, 1974, Soil survey of Cumberland County, Maine: U.S. Department of Agriculture, Soil Conservation Service Soil Survey, 94 p.

Thompson, W. B., 1977, Reconnaissance surficial geology of the Norway quadrangle: Maine Geological Survey, Open-File Map 77-34, scale 1:62,500.

USES OF SURFICIAL GEOLOGY MAPS

A surficial geology map shows all the loose materials such as till (commonly called hardpan), sand and gravel, or clay, which overlie solid ledge (bedrock). Bedrock outcrops and areas of abundant bedrock outcrops are shown on the map, but varieties of the bedrock are not distinguished (refer to bedrock geology map). Most of the surficial materials are deposits formed by glacial and deglacial processes during the last stage of continental glaciation, which began about 25,000 years ago. The remainder of the surficial deposits are the products of postglacial geologic processes, such as river floodplains, or are attributed to human activity, such as fill or other land-modifying features.

The map shows the areal distribution of the different types of glacial features, deposits, and landforms as described in the map explanation. Features such as striations and moraines can be used to reconstruct the movement and position of the glacier and its margin, especially as the ice sheet melted. Other ancient features include shorelines and deposits of glacial lakes or the glacial sea, now long gone from the state. This glacial geologic history of the quadrangle is useful to the larger understanding of past earth climate, and how our region of the world underwent recent geologically significant climatic and environmental changes. We may then be able to use this knowledge in anticipation of future similar changes for long-term planning efforts, such as coastal development or waste disposal.

Surficial geology maps are often best used in conjunction with related maps such as surficial materials maps or significant sand and gravel aquifer maps for anyone wanting to know what lies beneath the land surface. For example, these maps may aid in the search for water supplies, or economically important deposits such as sand and gravel for aggregate or clay for bricks or pottery. Environmental issues such as the location of a suitable landfill site or the possible spread of contaminants are directly related to surficial geology. Construction projects such as locating new roads, excavating foundations, or siting new homes may be better planned with a good knowledge of the surficial geology of the site. Refer to the list of related publications below.

OTHER SOURCES OF INFORMATION

1. Hildreth, C. T., 2000, Surficial geology of the Casco 7.5' quadrangle, Maine: Maine Geological Survey, Open-File Report 00-142.
2. Hildreth, C. T., 2000, Surficial materials of the Casco quadrangle, Maine: Maine Geological Survey, Open-File Map 00-143.
3. Neil, C. D., 1998, Significant sand and gravel aquifers of the Bridgton quadrangle, Maine: Maine Geological Survey, Open-File Map 98-151.
4. Thompson, W. B., 1979, Surficial geology handbook for coastal Maine: Maine Geological Survey, 68 p. (out of print).
5. Thompson, W. B., and Borns, H. W., Jr., 1985, Surficial geologic map of Maine: Maine Geological Survey, scale 1:500,000.
6. Thompson, W. B., Crossen, K. J., Borns, H. W., Jr., and Andersen, B. G., 1989, Glaciomarine deltas of Maine and their relation to late Pleistocene-Holocene crustal movements, *in* Anderson, W. A., and Borns, H. W., Jr. (eds.), Neotectonics of Maine: Maine Geological Survey, Bulletin 40, p. 43-67.